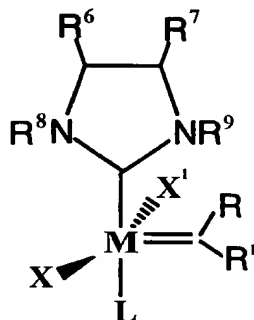


ABSTRACT

The present invention relates to novel metathesis catalysts with an imidazolidine-based ligand and to methods for making and using the same. The inventive catalysts are of the formula



wherein:

M is ruthenium or osmium;

X and X¹ are each independently an anionic ligand;

L is a neutral electron donor ligand; and,

R, R¹, R⁶, R⁷, R⁸, and R⁹ are each independently hydrogen or a substituent selected from the group consisting of C₁-C₂₀ alkyl, C₂-C₂₀ alkenyl, C₂-C₂₀ alkynyl, aryl, C₁-C₂₀ carboxylate, C₁-C₂₀ alkoxy, C₂-C₂₀ alkenyloxy, C₂-C₂₀ alkynyloxy, aryloxy, C₂-C₂₀ alkoxycarbonyl, C₁-C₂₀ alkylthiol, aryl thiol, C₁-C₂₀ alkylsulfonyl and C₁-C₂₀ alkylsulfinyl, the substituent optionally substituted with one or more moieties selected from the group consisting of C₁-C₁₀ alkyl, C₁-C₁₀ alkoxy, aryl, and a functional group selected from the group consisting of hydroxyl, thiol, thioether, ketone, aldehyde, ester, ether, amine, imine, amide, nitro, carboxylic acid, disulfide, carbonate, isocyanate, carbodiimide, carboalkoxy, carbamate, and halogen. The inclusion of an imidazolidine ligand to the previously described ruthenium or osmium catalysts has been found to dramatically improve the properties of these complexes. The inventive catalysts maintains the functional group tolerance of previously described ruthenium complexes while having enhanced metathesis activity that compares favorably to prior art tungsten and molybdenum systems.